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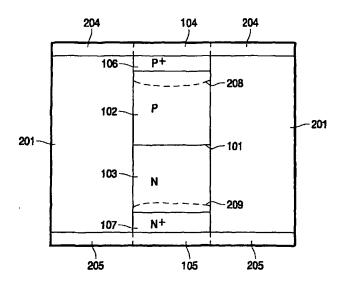
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[Continued on next page]

### (54) Title: SEMICONDUCTOR DEVICE WITH A FIELD SHAPING REGION



(57) Abstract: A semiconductor device, for example a diode (200), having a pn junction (101) has an insulating material field shaping region (201) adjacent, and possibly bridging, the pn junction. The field shaping region (201) preferably has a high dielectric constant and is coupled via capacitive voltage coupling regions (204,205) to substantially the same voltages as are applied to the pn junction. When a reverse voltage is applied across the pn junction (101) and the device is non-conducting, a capacitive electric field, is present in a part of the field shaping region which extends beyond a limit of the pn junction depletion region which would exist in the absence of the field shaping region (201), the electric field in the field shaping region inducing a stretched electric field limited to a correspondingly stretched pn junction depletion region (208,209) and an increased reverse breakdown voltage of the device.



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FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01L29/06 H01L H01L29/78 H01L29/41 H01L29/861 H01L29/73 According to International Patent Classification (IPC) or to both national classification and IPC **B. FIELDS SEARCHED** Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01L Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Category Citation of document, with indication, where appropriate, of the relevant passages 1-3, EP 0 519 741 A (KK TOSHIBA) X 6 - 15, 1823 December 1992 (1992-12-23) page 3, line 22 - page 4, line 46; figures 1,3 page 5, line 9 - line 12; figure 6 page 5, line 44 - line 46 1-4,6,7, US 2003/006458 A1 (TERASHIMA T) X 9 January 2003 (2003-01-09) 10-12, 16,18 page 3, paragraph '0053! - page 4, paragraph '0067!; figures 1,2 Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance invention 'E' earlier document but published on or after the international "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. \*O\* document referring to an oral disclosure, use, exhibition or document published prior to the international filing date but "&" document member of the same patent family later than the priority date claimed Date of mailing of the international search report Date of the actual completion of the International search 02/12/2004 23 November 2004 **Authorized officer** Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo ni, Morvan, D Fax: (+31-70) 340-3016

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